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Application No. 10/692,450
Reply to Office Action of December 02, 2008

REMARKS

This paper is responsive to the Office Action mailed on December 02, 2008 wherein claims 1-16, 20-26 were rejected and claims 17-19 were objected to. Claims 1-26 remain pending in this application. In view of the following amendments and remarks, Applicant requests further examination and reconsideration of the present patent application.

Examiner's response to arguments

In the "Response to Arguments" section on page 2, lines 6-8 of the Office Action mailed on December 02, 2008, the Examiner responded to the Applicant's arguments filed on September 09, 2008 and stated that the arguments have been fully considered and are persuasive. The Examiner further stated that therefore the Final rejection has been withdrawn. Applicant thanks the Examiner for withdrawing the finality of the previous rejection.

Objection to the claims

In the "Allowable Subject Matter" section on page 12, lines 2-6 of the Office Action mailed on December 02, 2008, the Examiner indicated that claims 17-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicant thanks the Examiner for indicating the allowability. Applicant believes that in view of the remarks and arguments below, claims 17-19 are patentable. Thus, Applicant respectfully request withdrawal of the Examiner's objection to claims 17-19.

35 USC §101

In the Office Action, claims 1-7 and 12-23 were rejected under 35 USC §101 as not falling within one of the four statutory categories of invention. See, Office Action, page 3, lines 6-7. Applicant respectfully traverses this rejection.

Legal Precedent and Guidelines
"machine-or-transformation test"

To satisfy the requirements under 35 U.S.C. § 101, the invention must satisfy the "machine-or-transformation test." The machine-or-transformation test is a test of patent eligibility under which a claim to a process qualifies to be considered for patenting only if it (1) is implemented with a particular machine, that is, one specifically devised and adapted to carry out the process in a way that is not concededly conventional and is not trivial; or else (2) transforms an article from one thing or state to another. The test has been articulated most recently in *In re Bilski*, 88 U.S.P.Q.2d 1385 (Fed. Cir. 2008), but dates back to the Nineteenth Century. The test is articulated also in the patent-eligibility trilogy *Diamond v. Diehr*, 450 U.S. 175 (1981); *Parker v. Flook*, 437 U.S. 584 (1978); *Gottschalk v. Benson*, 409 U.S. 63 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876). In determining when process or method claims include statutory subject matter, the Supreme Court in *Diehr* stated that "[t]ransformation and reduction of an article 'to a different state or thing' is the clue to the patentability of a process claim *that does not include particular machines*." See *id.* 450 U.S. at 183-185, 209 U.S.P.Q. at 6. Emphasis added.

The "machine-or-transformation test" is a two-branched inquiry; an applicant may show that a process claim satisfies § 101 either by showing that his claim is tied to a particular machine, or by showing that his claim transforms an article. See *Benson*, 409 U.S. at 70. Certain considerations are applicable to analysis under either branch. First, as illustrated by *Benson* and discussed below, the use of a specific machine or transformation of an article must impose meaningful limits on the claim's scope to impart patent-eligibility. See *Benson*, 409 U.S. at 71-72. Second, the involvement of the machine or transformation in the claimed process must not merely be insignificant extra-solution activity. See *Flook*, 437 U.S. at 590.

Referring to the instant application, independent claim 1 recites, *inter alia*, "a method for viewing an abnormality in different kinds of images." Claim 12 recites, *inter alia*, "a method for viewing an abnormality in different kinds of images." Additionally, independent claim 21 recites, *inter alia*, "a method for viewing an abnormality in different kinds of images."

In the Office Action mailed on December 02, 2008, lines 6-14, the Examiner quoted from the Supreme Court precedent and recent Federal Circuit decisions that apparently indicated that a statutory process under 35 USC §101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. The Examiner further stated that while the instant claims

recite a series of steps or acts to be performed, the claims neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. See, Office Action, page 3, lines 1-14. Applicant respectfully traverses this rejection.

In response to the comments of the Examiner stated above, the Applicant respectfully state that in view of the cases quoted above, case law has taken a measured approach to this question, and it may be reasonable here to interpret the boundaries of what constitutes patent-eligible transformations of articles. Specifically, Applicant respectfully asserts that the independent claims 1, 12 and 21 taken as a whole each recite statutory subject matter under 35 USC § 101 because (1) each of them is tied to another statutory category (such as a particular apparatus), or (2) each of them transforms underlying subject matter (such as an article or material) to a different state or thing.

Further, applicant respectfully states that each claim, as stated above, taken as a whole, recites either a method, or a system for method for viewing an abnormality in different kinds of images. Applicant further asserts that these methods, systems and machine readable media therefore stand the "machine-or-transformation test" of patent eligibility. For example, these methods and systems may be used for scanning an object using a first imaging system to obtain at least a first image of the object; determining coordinates of a region of interest (ROI) visible on the first image, wherein the ROI includes the abnormality; and using the coordinates of the ROI to scan the object with a second imaging system, as described in detail in the present Application. See Application, pages 7-17. Accordingly, Applicant respectfully request withdrawal of the rejection of independent claims 1, 12, 20, and 21, as well as all claims dependent thereon, under 35 U.S.C. §101.

More specifically, as to machine implementation, Applicant respectfully states that the language of claim 1 ties up the underlying process steps to the specific machine or system claimed in independent claims 8. In a similar manner, the language of claim 12 ties up the underlying process steps to the specific machine or system claimed in independent claim 24. Further, the language of claim 21 ties up the underlying process steps to the specific machine or system claimed in independent claim 24 and dependent claim 25.

As to the transformation part of the test, a claimed process is patent-eligible if it transforms an article into a different state or thing. This transformation must be central to the purpose of the claimed process. But the main aspect of the transformation test that requires clarification here is what sorts of things constitute "articles" such that their transformation is

sufficient to impart patent-eligibility under § 101. It is virtually self-evident that a process for a chemical or physical transformation of physical objects or substances is patent-eligible subject matter. As the Supreme Court stated in *Benson* 409 U.S. at 70 (quoting *Corning v. Burden*, 56 U.S. (15 How.) 252, 267-68 (1854)):

[T]he arts of tanning, dyeing, making waterproof cloth, vulcanizing India rubber, smelting ores . . . are instances, however, where the use of chemical substances or physical acts, such as temperature control, changes articles or materials. The chemical process or the physical acts which transform the raw material are, however, sufficiently definite to confine the patent monopoly within rather definite bounds.

see also *Diehr*, 450 U.S. at 184 (process of curing rubber); *Tilghman*, 102 U.S. at 729 (process of reducing fats into constituent acids and glycerine).

Referring to the instant application, the Applicant believes that the process claimed in each of independent claims 1, 12 and 21 is patent-eligible because it transforms the coordinates of a region of interest (ROI) visible on the first image of an object scanned using a first imaging system, wherein the ROI includes the abnormality to the coordinates of the ROI to a second imaging system for scanning the object with. Further, this transformation is central to the purpose of the claimed process.

Further, we believe the above legal points have been clarified by the U.S.P.T.O. in an attempt to stem Examiner errors in formulating rejections under 35 U.S.C. §101. In particular, John J. Love, the Deputy Commissioner for Patent Examination Policy issued a memo to the Technology Center Directors on April 12, 2007 titled: "Clarification of Interim Guidelines for Examination of Patent Applications for Subject Matter Eligibility". A copy of this memo has been attached as an Exhibit for the Examiner's convenience. The points made in this memo accord with those points noted above by the Applicant. In particular, as noted by the Deputy Commissioner:

It is the result that should be the focus. If the result has a real world practical application/use, then the test has been satisfied. The claim need not include the uses to which the result is ultimately put, just the result itself. Another example would be an improved method for measuring blood sugar levels in human beings. In this example, the end result is the blood sugar level which is a practical application for diagnostic purposes. Accordingly, reciting the improved method, and the result is achieves --- the measurement of the blood sugar level --- is all that is necessary for patent eligibility. The diagnostic steps that occur after the determination of the blood sugar level need not

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necessarily be present in the claims in order for the claims to be statutory.

Memo, dated April 12, 2007 by Deputy Commissioner John Love.

Thus as explained in the present specification and in the preceding discussion, the act of "directly inverting a respective Hessian matrix corresponding to each subset of pixels such that the pixels of each subset are simultaneously optimized with regard to a cost function" as recited in independent claims 1, 12 and 21 has a real world practical application in the generation of medical or diagnostic images. As explained by Deputy Commissioner Love, no more is required for the claims to be statutory. Therefore, the Applicant respectfully reiterate the request that the rejection of independent claims 1, 12 and 21, as well as all claims dependent thereon, under 35 U.S.C. §101 be withdrawn.

Further, in this connection, it may be pertinent to refer to the following sections from the United States Patent and Trademark Office (USPTO)'s *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility*, section IV, paragraph C, titled "*Determine Whether the Claimed Invention Falls Within Sec. 101 Judicial Exceptions - Laws of Nature, Natural Phenomena and Abstract Ideas*".

In particular, the text in section IV, paragraph C of the USPTO guidelines mentioned above reads:

While abstract ideas, natural phenomena, and laws of nature are not eligible for patenting, methods and products employing abstract ideas, natural phenomena, and laws of nature to perform a real-world function may well be. In evaluating whether a claim meets the requirements of section 101, the claim must be considered as a whole to determine whether it is for a particular application of an abstract idea, natural phenomenon, or law of nature, rather than for the abstract idea, natural phenomenon, or law of nature itself.

Further, section IV, paragraph C, part 2 entitled "Determine Whether the Claimed Invention is a Practical Application of an Abstract Idea, Law of Nature, or Natural Phenomenon Sec. 101(Judicial Exceptions)" reads:

To satisfy section 101 requirements, the claim must be for a practical application of the Sec. 101 judicial exception, which can be identified in various ways:

The claimed invention "transforms" an article or physical object to a different state or thing.

The claimed invention otherwise produces a useful, concrete and tangible result, based on the factors discussed below.

Applicant respectfully submits that independent claims 1, 12 and 21 are limited to particular practical applications in the technological arts. Specifically, each of the independent claims 1, 12 and 21 in its current version recites a method or system for viewing an abnormality in different kinds of images. The particular practical applications include scanning an object using a first imaging system to obtain at least a first image of the object; determining coordinates of a region of interest (ROI) visible on the first image, wherein the ROI includes the abnormality; and using the coordinates of the ROI to scan the object with a second imaging system, as described in detail in the present Application. In other words, the claimed invention "transforms" a tangible article, and acts on, but is not itself an abstract idea. The claimed invention, as recited in independent claims 1, 12 and 21, therefore as a whole recites statutory subject matter under 35 USC § 101 because (1) each of the independent claims is tied to another statutory category (such as a particular apparatus), or (2) each of the independent claims transforms underlying subject matter (such as an article or material) to a different state or thing. Moreover, the description contained in the specification is replete with specific examples of applications of the claimed method and system.

Applicant therefore request that the Examiner considers the independent claims 1, 12 and 21 as a whole to determine that the invention *is falling within one of the four statutory categories of invention* and withdraw the rejection of independent claims 1, 12 and 21 under 35 U.S.C. §101.

Applicant respectfully submits that claims 2-7, 13-19, and 22-23 depend directly or indirectly from claims 1, 12 and 21 respectively. Accordingly, the Applicant submits that claims 2-7, 13-19, and 22-23 are allowable by virtue of their dependency from allowable base claims:

35 USC §102

In the Office Action, the Examiner rejected claims 1-3, 6 and 8-10 under 35 USC 102(b) as anticipated by Burke et al., U.S. Patent No. 6421454B1 (hereinafter "Burke"). Of these, claims 1 and 8 are independent claims. Applicant respectfully traverses this rejection.

A prima facie case of anticipation under 35 USC §102 requires showing that each limitation of a claim is found in a single reference, practice or device. Applicant respectfully

asserts that the present invention, as recited in independent claims 1 and 8 are patentable over the Burke reference. To sustain a rejection under USC §102, a single reference must disclose each and every element of the claimed invention, the elements being configured in such a way as to fully disclose the claimed invention. The Applicant urge that the rejection of the present independent claims 1 and 8 under 35 USC §102 (b) as being anticipated by the Burke reference is unwarranted because the Burke reference does not disclose each and every element of the claimed invention, specifically the cited claim elements of the present independent claims 1 and 8.

The Applicant respectfully state that Burke fails to disclose each and every element of the independent claim 1 and specifically, the recitations of *scanning an object using a first imaging system to obtain at least a first image of the object; determining coordinates of a region of interest (ROI) visible on the first image, wherein the ROI includes the abnormality; and using the coordinates of the ROI to scan the object with a second imaging system*. In a similar manner, Burke fails to disclose each and every element of the independent claim 8 and specifically, the recitations of *an X-ray imaging system configured to scan an object to obtain at least one X-ray image of the object; and a controller configured to: determine coordinates of a region of interest (ROI) visible on the first image, the ROI including the abnormality; and utilize the coordinates of the ROI to scan the object with an ultrasound imaging system*.

The Examiner stated in Page 2 of the Office Action dated December 2, 2008 that the Burke reference teaches a method for viewing an abnormality in different kinds of images (optical correlator assisted detection for breast biopsy; Title), said method comprising scanning an object using a first imaging system to obtain at least a first image of the object (a film scanner scans in the radiographic image into the system and registers by a coarse registration step; col 15, lines 7-22); determining coordinates of a region of interest (ROI) visible on the first image (a ROI can be identified by a computer aided diagnosis system; col 15, lines 31-32 since the ROI is identified by a computer then the coordinate must be determined), wherein the ROI includes the abnormality (system for breast biopsy; Title); and using the coordinates of the ROI to scan the object with a second imaging system (the ROI of the breast is then scanned by ultrasonographic equipment at a high resolution setting; col 15, lines 42-45).

The Applicant refers to the paragraphs cited by the Examiner and respectfully states that Burke discloses a method of imaging small objects such as calcifications in a bodily tissue. The method includes the steps of providing radiographic image data from an identified region of interest (ROI) of the tissue using a first imaging unit; providing three-dimensional ultrasonographic image data corresponding to *substantially the same ROI either before or after*

said radiographic image data is provided and using a second imaging unit independent of said first imaging unit such that said ROI need not be identically positioned for both radiographic and ultrasonographic image acquisition. Nowhere Burke discloses scanning an object using a first imaging system to obtain at least a first image of the object; determining coordinates of a region of interest (ROI) visible on the first image, wherein the ROI includes the abnormality; and using the coordinates of the ROI to scan the object with a second imaging system.

Applicant respectfully submits that, in view of these distinctions, Burke cannot anticipate independent claims 1 and 8. Claims 2-3 and 6 depend directly or indirectly from independent claim 1; and claims 9-10 depend from independent claim 8 are therefore believed to be patentable by dependency. Accordingly, the Applicant submit that the Burke reference cannot establish a *prima facie* case of anticipation of claims 1-3, 6 and 8-10, and respectfully requests the Examiner to withdraw the rejection of these claims under Section 102(b) based on the Burke reference.

35 USC §103

In the Office Action, the Examiner rejected claims 4-5, 11-15 and 21-25 under 35 USC §103(a) as being unpatentable over Burke in views of Wang et al., US Patent application No. 2003/0007598. (hereinafter "Wang"); and claims 7,16,20 and 26 under 35 USC §103(a) as being unpatentable over Burke in views of Fu et al, US Patent Application No. 2005/0047544A1, (hereinafter "Fu"). Applicant respectfully traverses the rejection of these claims.

Applicant respectfully submits that the primary reference Burke does not teach, suggest, or disclose each and every element of the independent claim 1 and specifically the recitations of *scanning an object using a first imaging system to obtain at least a first image of the object; determining coordinates of a region of interest (ROI) visible on the first image, wherein the ROI includes the abnormality; and using the coordinates of the ROI to scan the object with a second imaging system.* In a similar manner, Burke does not teach, suggest, or disclose each and every element of the independent claim 8 and specifically, the recitations of *an X-ray imaging system configured to scan an object to obtain at least one X-ray image of the object; and a controller configured to: determine coordinates of a region of interest (ROI) visible on the first image, the ROI including the abnormality; and utilize the coordinates of the ROI to scan the object with an ultrasound imaging system.* In a similar manner, Burke does not teach, suggest, or disclose each and every element of the independent claim 12 and specifically the recitations of *determining coordinates of a region of interest (ROI) visible on an image obtained using a first imaging system, the ROI including the abnormality; utilizing the coordinates of the ROI to scan*

the object with a second imaging system different from the first imaging system; and registering 3-dimensional (3D) data relative to 2-dimensional (2D) data, wherein the 3D data is obtained using the second imaging system and the 2D data is obtained using the first imaging system. In a similar manner, Burke does not teach, suggest, or disclose each and every element of the independent claim 21 and specifically, the recitations of *scanning an object using an X-ray imaging system to obtain at least one X-ray image of the object; determining coordinates of a region of interest (ROI) on the X-ray image, wherein the ROI includes the abnormality; instructing a probe mover to move a probe to the coordinates to scan a specific region of the object, wherein the specific region is defined by the coordinates; and instructing an ultrasound imaging system to scan the specific region of the object to obtain at least one ultrasound image.* In a similar manner, Burke does not teach, suggest, or disclose each and every element of the independent claim 24 and specifically, the recitations of *an X-ray imaging system configured to scan an object to obtain at least one X-ray image of the object; and a controller configured to determine coordinates of a region of interest (ROI) visible on the X-ray image, the ROI including the abnormality; utilize the coordinates of the ROI to scan the object with an ultrasound imaging system; and register 2-dimensional (2D) data from which the X-ray image is generated with 3-dimensional (3D) data obtained by scanning the object with the ultrasound imaging system.* Therefore, the Applicant believes that Burke does not render the independent claims 1, 8, 12, 21, and 24 unpatentable under 35 USC §103(a).

Further, the secondary references do not overcome these deficiencies of Burke. First, Wang teaches a coordinated analysis process by which previously acquired X-ray and ultrasound images are analyzed independently. The ultrasound viewings in Wang's reference are conducted independently on the monitor of the ultrasound machine in real-time without referring to any x-ray mammogram information that may exist for the patient. Moreover, there appears to be no indication that coordinates of an ROI obtained using either the ultrasound or X-ray mammography system are used in the image acquisition processes of the other imaging system. Thus, Wang does not appear to disclose that coordinates of an ROI, as determined using a first system, are used to scan the object with a second imaging system. Therefore, Wang fails to obviate the deficiencies in the teachings of Burke.

Second, Fu similarly fails to obviate the deficiencies in the teachings of Burke. Fu teaches a method and system provided for registering a 2D radiographic image of a target with previously generated 3D scan data of the target. Specifically, Fu fails to disclose determining coordinates of a region of interest (ROI) visible on the first image, wherein the ROI includes the abnormality or using the coordinates of the ROI to scan the object with a second imaging

system. Therefore, Fu fails to obviate the deficiencies in the teachings of Burke.

Thus, none of the cited references either taken alone or in any hypothetical combination, specifically teach or suggest or disclose the invention as recited in independent claims 1, 8, 12, 16, 20, 21, and 24 and specifically the recitations of *scanning an object using a first imaging system to obtain at least a first image of the object; determining coordinates of a region of interest (ROI) visible on the first image, wherein the ROI includes the abnormality; and using the coordinates of the ROI to scan the object with a second imaging system*. Accordingly, Applicant respectfully submits that a prima facie case of obviousness cannot be established for independent claims 1, 8, 12, 21, and 24. Consequently, the dependent claims are allowable at least by virtue of their dependency from respective allowable base claims. Claims 4-5 and 7 depend directly or indirectly from independent claim 1; claim 11 depends from independent claim 8; claims 13-15, 16 and 20 depend directly or indirectly from independent claim 12; claims 22-23 depend directly or indirectly from independent claim 21; claim 25-26 depend directly from independent claim 24 are therefore believed to be patentable by dependency. Accordingly, the Applicant submit that the Burke reference cannot establish a *prima facie* case of obviousness of claims 4-5, 11-15, and 21-25; and 7, 16, 20, 26 and respectfully requests the Examiner to withdraw the rejection of these claims under Section 103(a) based on the Burke reference.

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Summary

For the reasons set out above, the Applicant respectfully submits that the application is in condition for allowance. Favorable reconsideration and allowance of the application are, therefore, respectfully requested.

If the Examiner believes that anything further is necessary to place the application in better condition for allowance, the Examiner is kindly asked to contact the Applicant's undersigned representative at the telephone number below.

Respectfully submitted,

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